

# Thermocenter TC40 / TC100

## User Manual



swiss made



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# User Manual Thermocenter TC40 / TC100

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# DECLARATION OF CONFORMITY



## Declaration of Conformity

Wir  
We  
Nous

**Renggli AG / Salvis-Lab**

(Name des Anbieters) (supplier's name) (nom du fournisseur)

**Birkenstrasse 31, CH-6343 Rotkreuz**

(Anschrift) (address) (adresse)

erklären in alleiniger Verantwortung, dass das Produkt  
declare under our sole responsibility that the product  
déclarons sous notre seule responsabilité que le produit

**Drying Oven**

**TC 40 / 100**

**Konstruktionsjahr 2002**

(Bezeichnung Typ oder Modell, Los-, Chargen- oder Seriennummer, möglichst Herkunft und Stückzahl)  
(name, type or model, lot, batch or serial number, possibly sources and numbers of items)  
(nom, type ou modèle, no de lot, d'échantillon ou de série, éventuellement sources et nombre d'exemplaires)

auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder normativen Dokument(en)  
übereinstimmt  
to which this declaration relates is in conformity with the following standard(s) or other normative  
document(s)  
auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou autre(s) document(s) normatif(s)

(Titel und/oder Nummer sowie Ausgabedatum der Norm(en) oder der anderen normativen (Dokumente)  
(title and/or number and date of issue of the standard(s) or other normative document(s)  
(titre et/ou no et date de publication de la (des) norme(s) ou autre(s) document(s) normatif(s)

Gemäss den Bestimmungen der Richtlinie(n): following the provisions of Directive(s); conformément  
aux dispositions de(s) Directive(s)  
(falls zutreffend) (if applicable) (le cas échéant)

**73/23/EWG  
EN 60335-1 1988**

**89/336/EWG  
EN 55014**

(Ort und Datum der Ausstellung)  
(Place and date of issue)  
(Lieu et date)

(Name/Unterschrift oder Kennzeichnung des Befugten)  
(name and signature or equivalent marking of authorised person)  
(nom et signature du signataire autorisé)

Rotkreuz, 12.02.2002

Marcel Käppeli  
Technical Manager

## Important Information

### Quick Information for Service

Please fill out all necessary information for your Thermocenter.  
It helps you when you contact your Dealer or Service department.

SERIAL NUMBER:	
PHONE NUMBER SERVICE	
PURCHASE DATE	
SOFTWARE VERSION (See Display at Power ON)	

Notes:

## Technical Data Sheet

### Technical Data's from the ovens

		TC-40	TC-100
<b>Outer Dimension</b>			
Width	mm	460	570
Height	mm	501	631
Depth	mm	527	660
Clearance distance from back wall	mm	250	250
Clearance distance from side wall	mm	250	250
<b>Inner Dimension</b>			
Width	mm	340	450
Height	mm	370	500
Depth	mm	330	460
Internal Volume	L	40	100
Shelf	Standard/max	1/8	1/8
Max. Load per shelf	Kg	20	20
Weight (empty)	Kg	30	50
Temperature Range approx. 5 °C over Room temp to	°C	200	200
Temperature Variation <sup>1)</sup> at 50 °C	± °C	0.4	0.4
Temperature Variation <sup>1)</sup> at 100 °C	± °C	1.0	1.0
Temperature Variation <sup>1)</sup> at 150 °C	± °C	1.5	1.7
Temperature fluctuation <sup>2)</sup> at 150 °C	± °C	0.2	0.2
Heating up time <sup>3)</sup> to 70 °C	Min	10	15
	to 150 °C	24	35
	to 200 °C		45
Recovering time after 30 sec door opening at 100 °C	Min	4	7
Air changes (exhaust flap open) at 100 °C	x/h	59	29
Power supply (±10%) 50/60 Hz	Volt	230	230
Nominal Wattage	Watt	1100	1100
Heat radiation at 100 °C	Watt	145	230
	at 150 °C	300	544
<b>Equipment</b>			
Microprocessor -Temperature Controller LCD Display		Yes	Yes
Timer	Hours / Min.	0-999h 59m	0-999h 59m
Adjustable fan speed	%	60 - 100	60 – 100
Printer – Communication Interface RS 232		Yes	Yes
Adjustable Print Interval		Yes	Yes
Programming	Program / Step	50 / 15	50 / 15
Ramp function adjustable in steps of	°C	0.1	0.1

1) Measured with 3 temperature probes on horizontal level / divided in 1/3 of the chamber size

2) maximum temperature deviation in time for one temperature probe

3) to 98% of set temperature

All technical specification are specified for units with standard equipment at an ambient temperature of 25 °C (77 °F) and a voltage fluctuation of ±10 %. The temperature data are determined in accordance to following DIN 12880, part 2 respecting the recommended wall clearances of 10 % of the height, width and depth of the inner chamber. All indications are average values, typical for units produced in series. We reserve the right to alter technical specifications at all times without prior notice.

## Introduction

### Overview

The THERMOCENTER TC40 / TC100 is an oven with a patented design. All functional elements are integrated in the door. Forced Air with an intelligent control of fan-speed in a range between 0-100%. of ramping functions. Fast and accurate heating up procedure. More applications available to users  
Microprocessor-controller with enhanced Fuzzy-Logic - Allows precise ramping of temperature as well as an excellent reproduction of temperature distribution in the chamber.  
Special Insulation - Less heat loss. Saves energy and costs. Ambient temperature of housing surface  
Robust Swiss quality design – Made even for scientific applications  
Work Chambers are of stainless steel and are provided with fully adjustable chromium plated rod shelves.  
The chambers have well radiuses corners for easy cleaning.  
Exterior is of textured powder coated mild steel.

### Applications

The THERMOCENTER is an extremely versatile oven. It can be used Research & Development, Quality Control as well industrial applications. Some examples: Drying and sterilization applications in scientific as well as industrial usage suit well for this oven. A must when precise temperature distribution and a high accuracy are needed. Examples of usage : Colour fastness test for textiles, Ageing test for plastics and foils, Quality control of electronic circuits, Food analysis, Dry sterilization in hospitals

**Note: The Thermocenter ovens are not built to use as ovens for drying substances which are explosive or let free explosive gases during the drying process.**

### Controller

Fuzzy-Logic microprocessor controller with digital alphanumeric LCD-Display, real time clock, variable fan speed and temperature ramp.  
Intelligent Fan-Speed control IntelliFan - Wide range of temperature ramping functions. More user application. In combination with Fuzzy-logic gives you an excellent stability of temperature distribution and accuracy of programmed ramp.  
Brilliant LCD Display for user-dialog and easy to operate keypad for fast programming and operating. User dialog with controller is displaying your local language. Up to five languages can be selected.  
Easy to operate and programming with EasyMenu  
It allows the storage of 50 programs and 15 program steps (a step = a ramp, a temperature, a fan-speed and a dwell time=Hold Time). The programs remain stored in memory even without external power (battery buffered).  
Holding Time (dwell time) 0 - 999h 59m  
The real time clock allows a process to be started at any time – i.e.: on January 6, 2002 at 5 30 in the morning.  
RS-232 interface. All data can be protocolled with a printer or computer. Remote controlling and programming, Door-Switch - switch-off heater/fan by opening door

### Door alarm

The door is observed by a mechanical switch. It is not possible to start a manual process when the door is open, the message "door open" will appear in the display. The heating process is interrupted when the door is opened during a manual process (heating LED off), as soon the door is closed the heating process will start again (heating LED on)

## **Safety**

DIN 12880 class 3.1 In case of over-temperature, a built in safety controller as a back-up circuit takes over the control of the heating and will shutdown the oven.

There is also an additional mechanical over-temperature device which shuts down the oven

High quality accurate PT 100 temperature sensors.

Superior "Swiss Made" manufacturing quality according ISO9001



## Getting Started

### Parts delivered

Your System will be delivered with following Parts:

- 1 System Unit
- 1 Shelf
- 1 Power Cord
- 1 User Manual

### Install requirements

Ensure that following conditions are met before you install the system.

Electric power connection as per type plate on inside of the door must meet your power connector.

For 230 V, 50/60 Hz min

For 115 V, 50/60 Hz min

The ambient temperature is min. +5° C ... max. 35° C (+40° F ... 95° F)

You can stack max 1 Thermocenter on top (for stacking adapter see option list)

If you install a ducting to exhaust system please see Option-List for further information

Leave at least 10cm space between system and walls or benches.

### Installing

Place shelf in appropriate position.

Plug cord

Close door.

Switch power on

Display shows current Firmware Version see Power On Sequence

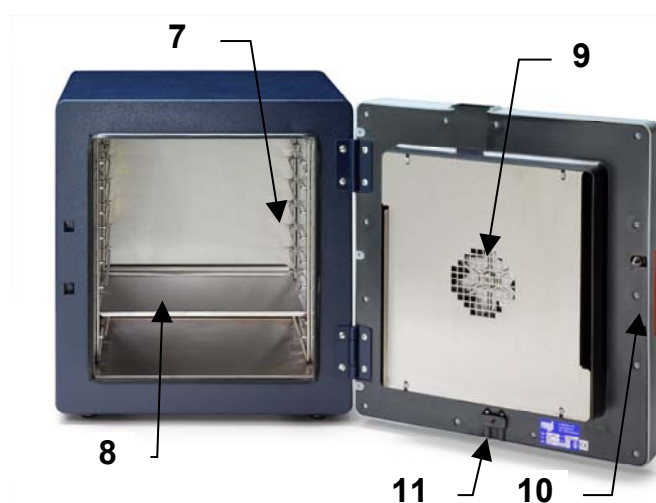
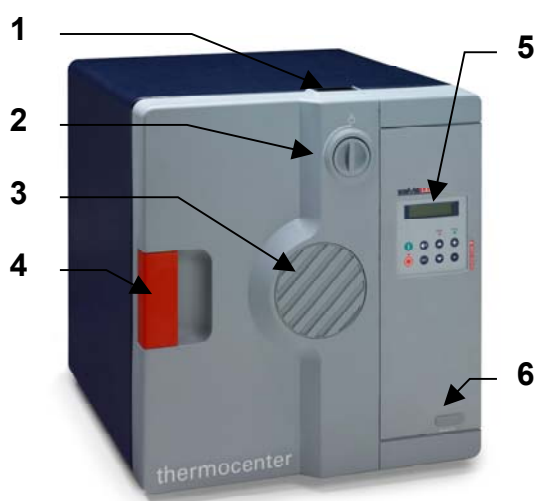
To start oven or program it see Chapter Operating Menus

### Cleaning

To clean the System use mild detergents. No Acid or similar detergents should be used.

## Your System Components

- 1 Air Exhaust
- 2 Air Flap
- 3 Air Inlet
- 4 Door Handle
- 5 Controller
- 6 RS232 Connector
- 7 Shelf Glider
- 8 Shelf
- 9 Fan Outlet
- 10 Spring loaded door lock
- 11 Door Switch to indicate a open door (alarm switch)



## Controller



To control the system the controller has few “easy to use” buttons on a foil keypad. Simply press desired button.  
All information is displayed on a Liquid Crystal Display (LCD) with backlit.  
LED Indicators for status of Power, Heat and Program are used to indicate the main process status.

Buzzer (not visible) is indicating audible Status or Alarm

## Keypad & Display

### Buttons



▲ Up You can scroll through the menu structure



▼ Down You can scroll through the menu structure



↶ Enter Confirm a menu selection, Confirm a value input or an answer choice



**ESC** Escape Cancel actual operation, Go back in Menu Structure, Quit actual state ....



**+** Plus Increase a value in flashing input fields , Select multiple Choices;  
Input Value must flash to make + button operable



**-** Minus Decrease a flashing value, Select multiple Choices;  
Input Value must flash to make + button operable



ON/OFF Switch ON or OFF your System. When on LED is lit

### LED Indicators



When **lit**: Heat Power is on



When **lit**: You are running a program  
When **flashing**: A delayed start for program operation was entered.

## Operating

### How to interpret displays described in this manual...

#### Power ON Sequence



Salvis Lab  
Revision XX.XX

By pressing the power-on button, the display will show the software version. All standard, pre-setted or saved information will be loaded during this process. After a while display will show first Main Menu Point

#### Input Field



Set Temperature  
180.0°C

A input value which is underlayed with yellow(grey) background means this value is flashing on the real display.

#### Multiple Input Fields



Set Start-Date  
DDMMYY 17.08.07

If you reach a multiple input display first time, the first part (... of 3 in this example) of the input field is flashing to indicate input here.. Flashing input fields are changed with +/- keys

#### Multiple Choice Fields



Display Interval  
Off On

In a multiple choice field the last actual setted (pre-set) option will flash. Change option with + or – and confirm with ↵

### Definitions of terms

#### What is a Set Temperature?

A Set Temperature is the target temperature you want operate the system with.

#### What is a Gradient?

A Gradient is the slope of the heating up process to the specific set temperature.

It is indicated as °C / Minute. Negative Gradients are not allowed. The maximal value of a gradient is system depending and has a range and is pre-defined by factory. A system specific curve of gradient corridors see

#### What is a Fan Speed?

The Fan-Speed is a percentage of a range of rounds per minute. The minimal or maximal RPM Value is system depending. The % Value is based on this min/max range.

#### What is a Holding Time?

A timer is used to specify how long a set temperature has to be hold. The timer starts counting back when the set temperature is reached. The maximal time you can set is: 999 hours and 59 minutes. This equals a max time of 41 days 15 hours and 59 minutes

#### What is a Start Date/Time

If you are using a start date or time you will be able to set a future date/time to start the system with pre-setted parameters i.e. temperature, Gradient, Fan Speed, Timer

# Main Menu Overview

## General operation buttons

In general you can scroll through the menu points with the ▼ or ▲ button.  
Select the desired menu point with ↵

### 1 Temperature & Options

A screenshot of a monochrome LCD screen showing the text "Main Menu" on the first line and "Temp & Options" on the second line.

Manual operation with a set temperature. You can select options like gradient, hold-time (dwell-time), fan speed, pre-setted start date/time.

Press ← to select → 1.1

ESC returns to → 1

### 2 Program

A screenshot of a monochrome LCD screen showing the text "Main Menu" on the first line and "Program" on the second line.

The menu Program is divided in menus for creating, editing, deleting and printing programs.

Press ← to select → 2.1

ESC returns to → 1

### 3 Configuration

A screenshot of a monochrome LCD screen showing the text "Main Menu" on the first line and "Configuration" on the second line.

This menu point allows you to configure the system

Press ← to select → 3.1

ESC returns to → 1

### 4 Service Mode

A screenshot of a monochrome LCD screen showing the text "Main Menu" on the first line and "Service Mode" on the second line.

This menu point is protected by an access-code and is available only for trained Service-Technicians.

Press ← to select → 4.1

ESC returns to → 1

# 1 Main Menu Temp & Options

The screen displays 'Main Menu' on the top line and 'Temp & Options' on the bottom line.

Manual operation with a set temperature. You can select options like gradient, hold-time (dwell-time), fan speed, pre-setted start date/time.

Press **↵** to select → 1.1

**ESC** returns to → 1

## 1.1 Set Temperature

The screen displays 'Set Temperature' on the top line and '120.0°C' on the bottom line.

**+/-** change desired value.

**↵** confirms and saves value → 1.2

**ESC** restores the old value or returns to → 1

## 1.2 Select Quick Start or Start with Options

The screen displays 'Start ?' on the top line and 'Now Options' on the bottom line.

**+/-** Select desired answer

**↵** confirms and saves value

If **Now** selected: System will start immediately → 6

If **Option** selected → 1.3

**ESC** cancels and returns to → 1

## 1.3 Set Gradient

The screen displays 'Gradient' on the top line and '2.0°C/Min' on the bottom line.

**+/-** Change value

**↵** confirms and saves the value → 1.4

**ESC** restores the old value or returns to → 1

**Note:** A value of 0,0 means maximal possible heating rate!

## 1.4 Set Holding Time (dwell time)

The screen displays 'Hold Time' on the top line and 'HH:MM' on the bottom line, with '15:00' highlighted.

**+/-** Change value

**↵** confirm value and skips to the next input field (HH → MM) or stores the time and go to → 1.5

**ESC** restores the old value and skips back one input field (MM → HH) or goes back to → 1

**Note:** A value of 0:00 means endless holding time

## 1.5 Set Fan Speed

The screen displays 'Fan Speed' on the top line and '100%' on the bottom line.

**+/-** Change value

**↵** confirms and saves the value → 1.6

**ESC** restores the old value or returns to → 1

**Note:** The minimal Fan Speed is depending on the system and is factory set.

## 1.6 Set Start-Date



+/- Change desired value

←confirm value and skips to the next input field (DD → MM, MM→YY) or stores the date and go to → 1.7

ESC restores the old value and skips back one input field (YY→MM, MM→ DD) or goes back to → 1

**Note:** The pre-set date is the actual date from the real-time clock.

## 1.7 Set Start Time



+/- Change desired value

←confirm value and skips to the next input field (HH → MM) or stores the time and go to :

If the Start Date and/or Start Time is in the **past**, the display will return back to → 1

If your Start Date and/or Start Time is in the **future** you will see the operating display → 5

ESC restores the old value and skips back one input field (MM→HH) or goes back to → 2.1

**Note:** The pre-set time is the actual time from the real-time clock.

## 2 Main Menu Program

A screenshot of a terminal window showing the text "Main Menu Program" in a monospaced font, with "Main Menu" on the first line and "Program" on the second line.

The menu Program is divided in menus for creating, editing, deleting and printing programs.

Press **↵** to select **→ 2.1**

**▼/▲** to scroll through the Main Menu

**ESC** return to **→ 1**

### 2.1 Menu Program - Start

A screenshot of a terminal window showing the text "Menu Program Start" in a monospaced font, with "Menu Program" on the first line and "Start" on the second line.

Start an existing program

**↵** confirm menu choice **→ 2.1.1**

**▼/▲** scroll through the Menu.

**ESC** return to **→ 2**

### 2.2 Menu Program - New

A screenshot of a terminal window showing the text "Menu Program New" in a monospaced font, with "Menu Program" on the first line and "New" on the second line.

Create a new program

**↵** confirm menu choice **→ 2.2.1**

**▼/▲** scroll through the Menu.

**ESC** return to **→ 2**

### 2.3 Menu Program - Edit

A screenshot of a terminal window showing the text "Menu Program Edit" in a monospaced font, with "Menu Program" on the first line and "Edit" on the second line.

Edit an existing program

**↵** confirm menu choice **→ 2.3.1**

**▼/▲** scroll through the Menu.

**ESC** return to **→ 2**

### 2.4 Menu Program - Delete

A screenshot of a terminal window showing the text "Menu Program Delete" in a monospaced font, with "Menu Program" on the first line and "Delete" on the second line.

Delete an existing program

**↵** to select [Delete Program] **→ 2.4.1**

**▼/▲** scroll through the Menu.

**ESC** return to **→ 2**

### 2.5 Menu Program - Print

A screenshot of a terminal window showing the text "Menu Program Print" in a monospaced font, with "Menu Program" on the first line and "Print" on the second line.

Print a program

**↵** to select [Print Program] **→ 2.5.1**

**▼/▲** to scroll through the Menu.

**ESC** return to **→ 2**



## 2.1 Menu Program Start



Menu Program  
Start

Start an existing program  
←confirm menu choice→ 2.1.1  
▼/▲ scroll through the sub-menu.  
**ESC** returns to → 2

### 2.1.1 Select Program #



Program # ? P04

+/- select desired program number  
←confirm value → 2.1.2  
**ESC** returns to → 2.1

**Note:** Only stored only program numbers with content will appear in the display. If no program exist a beep-message will displayed.

### 2.1.2 Choose type of program start



Start Prog P04  
Now Delayed

+/- select type of program start  
←accept choice  
If **Now** selected: System starts immediately → 6  
If **Delayed** selected :→ 2.1.3  
**ESC** returns to → 2.1

### 2.1.3 Set Start Date



Start Date P04  
DDMMYY 15.05.07

+/- Change desired value  
←confirm value and skips to the next input field (DD → MM, MM→YY) or stores the date and go to → 2.1.4  
**ESC** restores the old value and skips back one input field (YY→MM, MM→ DD) or goes back to → 2.1  
**Note:** The pre-set date is the actual date from the real-time clock.

### 2.1.4 Set Start Time



Start Time P04  
HH:MM 13:10

+/- Change desired value  
←confirm value and skips to the next input field (HH → MM) or stores the time and go to :  
If the Start Date and/or Start Time is in the **past**, the display will return back to → 2.1.2  
If your Start Date and/or Start Time is in the **future** you will see the operating display → 7  
**ESC** restores the old value and skips back one input field (MM→HH) or goes back to → 2.1  
**Note:** The pre-set time is the actual time from the real-time clock.

## 2.2 Menu Program New

The storage capacity is 50 Programs with 15 Steps/Program. Each Step contains of a Set-Temperature, a Gradient, a Hold-Time and a Fan-Speed.

The sample here assumes creating a program #4 with 2 Steps



Create a new program  
←confirm menu choice → 2.2.1  
▼/▲ scroll through the Menu-Program.  
ESC returns to → 2

### 2.2.1 Create a new program



+/- select desired program number  
←confirms the choice → 2.2.2  
ESC returns to → 2.2

**Note:** Only free program numbers will appear in the display.

### 2.2.2 Set Temperature – Step 1



+/- change desired value. Pre-set value is the last used value in manual mode.

←confirm and saves → 2.2.3

ESC restores the old value or returns to → 2.2 and the step 1 as well as selected program number is not stored !

**Note:** Display 04/01 means actual program/step number.

### 2.2.3 Set Gradient – Step 1



+/- change desired value

←confirms the value → 2.2.4

ESC restores the old value or returns to → 2.2 and the step 1 as well as selected program number is not stored !

**Note:** A value of 0:0 means maximal gradient

### 2.2.4 Set holding time (dwell time) – Step 1



+/- Change desired value

←confirm value and skips to the next input field (HH → MM) or stores the time and go to → 2.2.5

ESC restores the old value and skips back one input field (M→H) or goes back to → 2.2 and the step 1 as well as selected program number is not stored !

**Note:** A value of 0:00 means endless holding time

### 2.2.5 Set Fan Speed – Step 1



+/- change desired value

←confirm value → 2.2.6

ESC restores the old value or returns to → 2.2

**Note:** The minimal Fan Speed is depending on the system and is factory set.

### 2.2.6 Choose if a additional step is required



+/- Select desired answer

←accept

If **Yes** selected: step number will increment with 1 → 2.2.7

If **No** selected: → 2.2.12

### 2.2.7 Set Temperature – Step 2



+/- change desired value

←confirm the value → 2.2.8

**ESC** restores the old value or **if in step 2 and higher** returns to → 2.2.6 but the actual step will not be saved !

**Note:** Display 04/02 means actual program/step number

### 2.2.8 Set Gradient – Step 2



+/- change desired value

←confirm the value → 2.2.9

**ESC** restores the old value or **if in step 2 and higher** returns to → 2.2.6 but the actual step will not be saved !

### 2.2.9 Set Holding Time – Step 2



+/- Change desired value

←confirm value and skips to the next input field (HH → MM) or stores the time and go to → 2.2.10

**ESC** restores the old value and skips back one input field (M→H) or **if in step 2 and higher** returns to → 2.2.6 but the actual step will not be saved !

**Note:** A value of 0:00 means endless holding time

### 2.2.10 Set Fan Speed - Step 2



+/- change desired value

←confirm the value → 2.2.11

**ESC** restores the old value or **if in step 2 and higher** returns to → 2.2.6 but the actual step will not be saved !

### 2.2.11 Choose if a additional step is required



+/- Select desired answer

←accept

If **Yes** selected: step number will increment with 1 → 2.2.7

If **No** selected: → 2.2.12

### 2.2.12 End of programming sequence



+/- Select desired answer

←accept

If **Yes** selected: → 2.2.13

If **No** selected: → 2.2.11

### 2.2.13 Confirming & Saving the new program



Displays confirmation that the new program has been stored.  
After a few seconds the display will return to → 2.2

## 2.3 Menu Program Edit

The example assumes to edit the program #4 with 2 steps



Edit an existing program  
←confirm menu choice → **2.3.1**  
▼/▲ scroll through the Menu.  
**ESC** returns to → **2**

### 2.3.1 Choose program to edit



+/- select desired value  
←confirms the value and skips to the next field (P→S) or → **2.3.2** (to the selected Step Number respective)  
**ESC** returns to → **2.3**

**Note:** Only used program and step numbers will appear in the display

### 2.3.2 Edit Temperature – Step 1



+/- change desired value. Pre-set value is the last used value in manual mode.  
←confirms and saves the value → **2.3.3**  
**ESC** restores the old value or returns to → **2.3**  
**Note:** Display 04/01 means actual program/step number.

### 2.3.3 Edit Gradient – Step 1



+/- change desired value  
←confirms and saves the value → **2.3.4**  
**ESC** restores the old value or returns to → **2.3**

### 2.3.4 Edit Holding Time – Step 1



+/- Change desired value  
←confirm value and skips to the next input field (HH → MM) or stores the time and go to → **2.3.5**  
**ESC** restores the old value and skips back one input field (M→H) or returns to → **2.3**

### 2.3.5 Edit Fan Speed – Step 1



+/- change desired value  
←confirms and saves the value → **2.3.6 (next step)**  
**ESC** restores the old value or returns to → **2.3**

### 2.3.6 Edit Temperature – Step 2



+/- change desired value. Pre-set value is the last used value in manual mode.  
←confirms and saves the value → **2.3.7**  
**ESC** restores the old value or returns to → **2.3**  
**Note:** Display 04/01 means actual program/step number.

### 2.3.7 Edit Gradient – Step 2



Gradient  
04/02 1.2° C/Min

+/- change desired value  
↵ confirms and saves the value → 2.3.8  
ESC restores the old value or returns to → 2.3

### 2.3.8 Edit Holding Time – Step 2



Hold Time  
04/01 H:M 10:58

+/- Change desired value  
↵ confirm value and skips to the next input field (HH → MM) or stores the time and go to → 2.3.9  
ESC restores the old value and skips back one input field (M → H) or returns to → 2.3

### 2.3.9 Edit Fan Speed – Step 2



Fan Speed  
04/02 100%

+/- change desired value  
↵ confirms and saves the value → 2.3.10 (next step)  
ESC restores the old value or returns to → 2.3

### 2.3.10 Decide if a new step must be added



New Step ?  
Yes No

+/- Select desired answer  
↵ accept  
If Yes selected: step number will increment with 1 → 2.3.6  
If No selected: → 2.3.11

### 2.3.11 Confirm end of editing program



End of Program ?  
Yes No

+/- Select desired answer  
↵ accept  
If Yes selected: → 2.3.12  
If No selected: → 2.3.10

### 2.3.12 Save program display



Program P04  
Stored...

Displays confirmation that the new program has been stored.  
After a few seconds the display will return to → 2.3

## 2.4 Menu Program Delete



Menu Program  
Delete

Delete an existing program  
←select menu → 2.4.1  
▼/▲ scroll through the menu.  
ESC returns to → 2.4

### 2.4.1 Choose program # to be deleted



Program # ?  
P04

+/- select desired program number  
←accept → 2.3.2  
ESC returns to → 2.4

**Note:** Only used program numbers will appear in the display

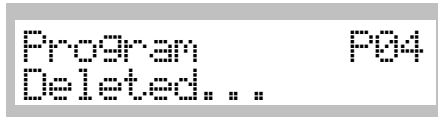
### 2.4.2 Deletion confirmation will be displayed



Delete Program  
Yes No

+/- Select desired answer  
←accept  
If Yes selected: → 2.4.3  
If No selected: → 2.4

### 2.4.3 Deletion confirmation will be displayed



Program Deleted...  
P04

Display confirms that the selected program has been deleted.  
After a few seconds it will go to → 2.4

If you delete a program means you delete all steps associated to this program number. After deleting, the number is now available in the list of free program numbers.

## 2.5 Menu Program Print



Menu Program  
Print

Print a program  
←to select [Print Program] → 2.5.1  
▼/▲ to scroll through the Menu.  
ESC return to → 2

### 2.5.1 Choose program # to be printed



Program # ?  
P04

+/- select desired program number  
←accept → 2.5.2  
ESC return to → 2

**Note:** Only used program numbers will appear in the display

### 2.5.2 Displaying print in progress



Program Printing...  
P04

Display confirms that the program has been printed. After a few seconds it will return to → 2.5

For an example of printout and printer connection refer section Printer Operation

## 3 Main Menu Configuration

Configuration of the system by the user



Main Menu  
Configuration

In this menu point you can define and set system options  
Press **↵** to select **➔ 3.1**  
**▼/▲** scroll through the menu.

### 3.1 Select language



Language  
**EN** GE FR IT ES

+/- Select the desired language  
**↵** confirm selection **➔ 3.2**

#### Attention:

After confirmation the selection all subsequent dialogs are displayed in the selected language.

### 3.2 Set actual date for internal real-time clock



Actual Date  
DDMMYY **14.08.07**

+/- change value  
**↵** accept value and skips to the next input field ((DD **➔** MM, MM**➔** YY) or saves the date and goes to **➔ 3.3**  
**ESC** restores the old value and/or skips back one input-field (YY**➔** MM, MM**➔** DD)

### 3.3 Set actual time for internal real-time clock



Actual Time  
HH:MM **12:59**

+/- change value  
**↵** accept value and skips to the next input field ((HH **➔** MM) or saves the time and goes to **➔ 3.4**  
**ESC** restores the old value and/or skips back one input-field (MM**➔** HH)

### 3.4 Set allowed max Temperature



Max. Temperature  
**150.0** °C

Set the maximal possible temperature value for manual operation.  
+/- change value  
**↵** accept value **➔ 3.5**  
**ESC** restores value

### 3.5 Set print interval for printer log via serial RS232 Interface



Print Interval  
HH:MM **00:01**

Set the Print Interval time. A value of 00:00 will disable printout of operating values.  
+/- change value  
**↵** accept value and skips to the next input field ((HH **➔** MM) or saves the time and goes to **➔ 3.4**  
**ESC** restores the old value and/or skips back one input-field (MM**➔** HH)



### 3.6 Set automatic interval to scroll status displays



Select if operation displays will switch automatically instead of manually switching by ▼/▲ keys  
+/- toggle answer  
←accept → 3.7

### 3.7 Select Baud Rate for serial RS232 Interface



Available Baud Rate are 1200/2400/4800/9600.  
+/- select value  
←accept → 3.8

### 3.8 Set Program End Buzzer



Buzzer sends a signal if a program has finished signal.  
+/- toggle option  
←accept → 3.9

### 3.9 Set Safety Alarm-Buzzer



In any case of an over temperature alarm situation, the Buzzer will give an audio signal.  
+/- toggle option  
←accept → 3.10

### 3.10 Set LCD Display contrast



+/- change value  
←accept → 3.11  
ESC restores value

### 3.11 Set Offset between internal PT100 Sensor and actual display



Offsets the internal PT100 sensor with the actual displayed temperature. Calibrate with an external temperature sensor.  
+/- change value  
←accept → 3.12  
ESC restores value

### 3.12 Confirmation display of storing entered values



The Display confirms that the Configuration has been Stored.  
After a few seconds it will return to → 3

## 4 Menu Service Mode



This menu point is protected by a code and is only available for trained Service-Technicians.

## Operating Displays

### General

Change the display with ▼/▲ keys or set Display Interval to yes in Menu Configuration to let change the display automatically every 10 sec.

### 5 Operating Display: Manual Mode Delayed Start



```
Start-Date
09.09.07 13:10
```

Here you can see the actual Start Date and Time.  
Press ▼ to get next set of operating displays.



```
SetTemp 120.0°C
Holdtime 105:00
```

Here you can see the Set Temp and the Hold Time (dwell time).  
Press ▼ to get next set of operating displays.



```
Fan 100%
Gradient 2.0°C/M
```

Here you can see the Fan-Speed and gradient  
Press ▼ to get next set of operating displays.

### 6 Status Display: Normal Mode Running



```
Set Temp 120.0°C
Act Temp 120.0°C
```

Here you can see the Set Temp and the Actual Temp. Press ▼ to get more information's of the Operating Display.



```
Fan Speed 100%
Timer 15:00
```

Here you can see the Fan Speed and the Timer. Press ▼ to get more information of the Operating Display.

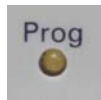


```
Date 05.05.07
Time 14:18
```

Here you can see the actual Date and Time. This is the last information of the Operating Display. Press the ▼ button to see first display again

## 7 Status Display: Program mode Delayed Program Start

If the programmed Start Date/Time has achieved the Display switches to ➔ 8



The „Prog“ LED is on during a programmed operation

```
Start Date  P04
09.09.07    13:10
```

Here you can see the actual Start Date and Time. Press ▼ to get more information of the Operating Display.

## 8 Status Display: Program mode Program Running

```
Set Temp  90.0°C
Act Temp  90.5°C
```

Here you can see the Set Temperature and the Actual Temperature of the Program Step. Press ▼ to get more information of the Operating Display.

```
Program    04
Step       01
```

Here you can see the Program Number and the Step. Press the ▼ button to get more information of the Operating Display.

```
Fan        100%
Gradient  2.0°C/M
```

Here you can see the Fan Speed and the Gradient. Press the ▼ button to get more information of the Operating Display.

```
Hold Time  20:30
09.09.07    14:09
```

Here you can see the Hold Time and actual Date and Time in the format DD.MM.YY. This is the last information of the Operating Display. Press the ▼ button to see first display again

If the program has ended a beep tone (5x) will sound and following display will shown:

```
Status:
Program finished
```

Status Message can be confirmed by pressing the ↵key.

## 9 Cancel a running process by ESC Key

A running system is stopped by pressing ESC.

### 9.1 Safety question when stopping a running system

```
Stop Process?
Yes           No
```

+/- Select desired answer

↵accept

If Yes selected: ➔ 9.2

If No selected: ➔ Back to running status

### 9.2 Conformation of cancelling a process

```
Process stopped
```

Display confirms that the running process has been cancelled. After a few seconds it will return to Main Menu ➔ 1

## 10 Messages and Errors

The messages and Errors are announced with a beep tone (5x) and can be confirmed by pressing the **↵**Key. Errors are severe system failures and must fixed by trained service people.

### Messages

Message: No Program	Indicates that no program is in memory
Message: Memory Full	Indicates that the program memory is full
Message: Door Open	Indicates that the door is open while you try to start the system (TC40,TC100 only)

### Errors

Error: PT100	PT100 Sensor or cable defect. Call Service
Error: Safety Bond	Safety Controller was active. Call Service
Error: Temp out of range	Temperature exceeded security range level. Cool down oven. If error persist call Service
Unexpected Error	Call Service

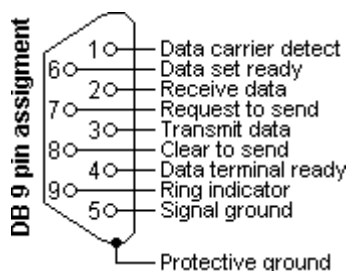
## Printer Operation

### Connecting a Printer

#### Printer Requirements

In order to connect a printer with the serial RS232 Interface of the System following requirements must be fulfilled : Serial RS232 Interface, Min. 1200 Baud Transfer Rate

#### Pin Layout RS232 DB9 Connector System:



Used Pins: 2:TxD , 3:RxD and 5:Signal Ground  
Data format: 8 Data Bits, 1 Stop Bit, No Parity

### Sample for Printing

#### Sample printout of a stored program

See also [ Print Program ] ➔ 2.5

```
Program #1

Step: 1
Set Temperature:      130,0 °C
Gradient              1,5 °C/Min
Hold Time:           2:30 HHH:MM
Fan Speed            100 %

Step 2
Set Temperature:      180,0 °C
Gradient              1,5 °C/Min
Hold Time:           0:45 HHH:MM
Fan Speed            80 %
```

#### Sample printout of a running log

See also Print Interval ➔ 3.5

```
10.04.07, 09:34

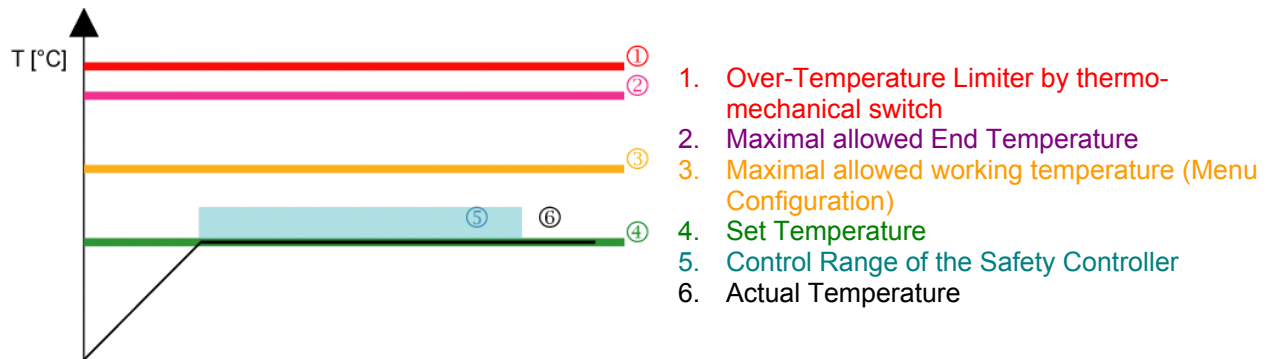
Set Temperature:      130,5 °C
Act Temperature:      130.6 °C
Gradient              1,5 °C/Min
Hold Time:           1:00 HHH:MM
Fan Speed            94 %

10.04.07, 09:35

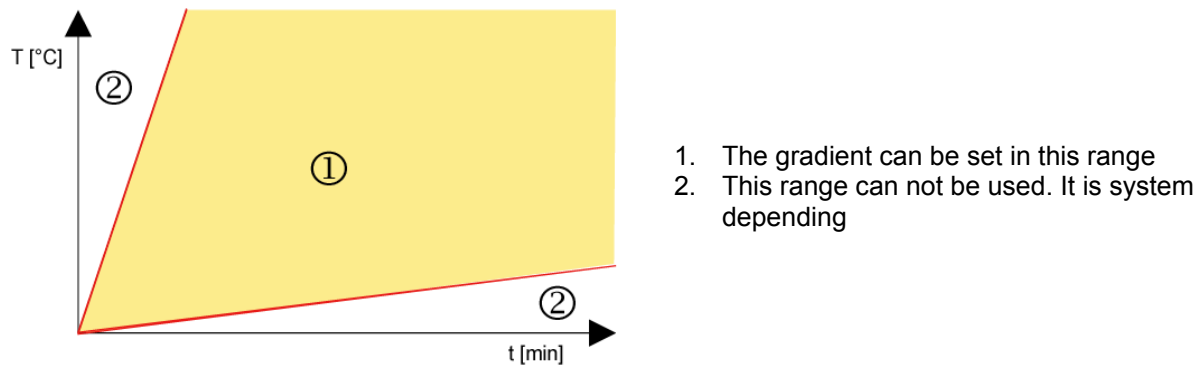
Set Temperature:      130,5 °C
Act Temperature:      130.5 °C
Gradient              1,5 °C/Min
Hold Time:           1:00 HHH:MM
Fan Speed            94 %
```

## Appendix A

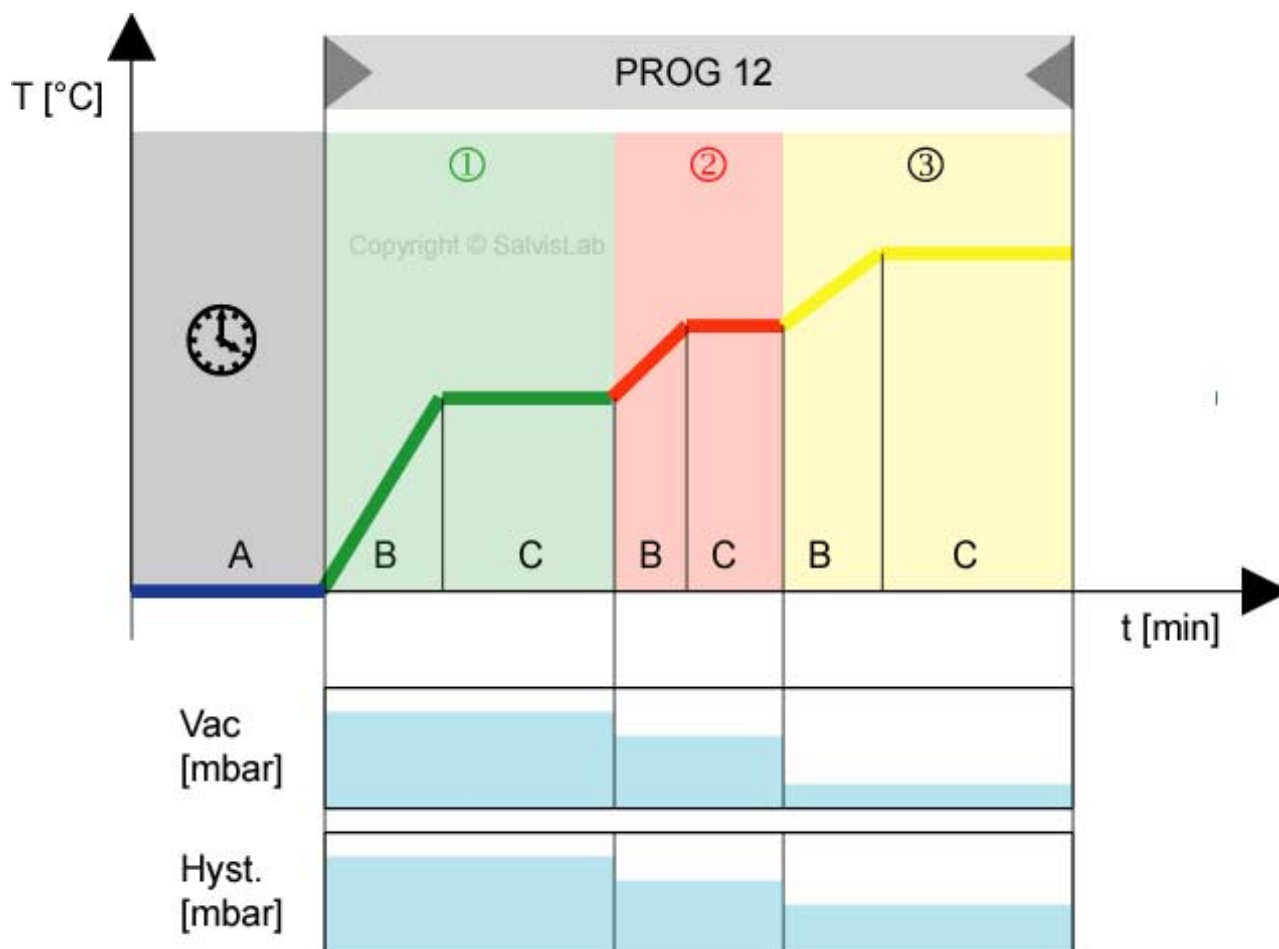
### Temperature limiter and Safety controller



### Range of gradient



## Graphical presentation of a program



This example shows a program No. 12 with 3 steps and a pre-set start date/time.

- A Timeframe of the pre-set start date/time
- B Positive Gradient (adjustable)
- C Hold-Time, Dwell-Time (Adjustable)

Each of the following 3 steps has the parameter: Set-temperature, gradient, hold-time, set-vacuum, hysteresis vacuum

- 1 Step 1 : Start of program
- 2 Step 2 : New parameter setting where used.
- 3 Step 3 : New parameter setting where used. After finishing the step 3, the program ends.

## Appendix B

### Menu Structure & Input Fields

\* = Menu Point

□ = Input Field

◇ = Decision Input ○ = Display only

	Pt		To pt
*	1	Main Menu Temp & Options	
□	1.1	Set Temperature	1.2
◇	1.2	Quick Start? Now Options	6 1.3
□	1.3	Gradient	1.4
□	1.4	Hold Time	1.5
□	1.5	Fan Speed	1.6
□	1.6	Start Date	1.7
□	1.7	Start Time	6 or 7

	Pt		To pt
*	2	Main Menu Program	
*	2.1	Start Program	
□	2.1.1	Select Program	2.1.2
◇	2.1.2	Start Program? Now Delayed	6 2.1.3
□	2.1.3	Set Start Date	2.1.4
□	2.1.4	Set Start Time	8
*	2.2	New Program	2.2.1
□	2.2.1	Select Program	2.2.2
□	2.2.2	Set Temperature	2.2.3
□	2.2.3	Gradient	2.2.4
□	2.2.4	Hold Time	2.2.5
□	2.2.5	Fan Speed	2.2.6
◇	2.2.6	New Step? Yes No	2.2
◇	2.2.7	End of Program Yes No	2.2 2.2.6
○	2.2.8	Program stored..	2
*	2.3	Edit Program	2.3.1
□	2.3.1	Select Program / Nr	2.3.2
□	2.3.2	Set Temperature	2.3.3
□	2.3.3	Set Gradient	2.3.4
□	2.3.4	Set Hold Time	2.3.5
□	2.3.5	Set Fan Speed	2.3.6
◇	2.3.6	New Step? No Yes	2.3.7 2.3.1
◇	2.3.7	End of Program No Yes	2.3.6 2.3
○	2.3.8	Program stored..	2
*	2.4	Delete Program	2.4.1
□	2.4.1	Select Program	2.4.2
◇	2.4.2	Delete Program Yes No	2.4.3 2.4.1
○		Program Deleted	2.4
*	2.5	Print Program	2.5.1
□	2.5.1	Select Program	2.5.2
○	2.5.2	Program Printing	2.5

	Pt		To pt
	3	Main Menu Configuration	
□	3.1	Language	3.2
□	3.2	Date	3.3
□	3.3	Time	3.4
□	3.4	Max. Temp	3.5
□	3.5	Print Interval	3.6
□	3.6	Disp Interval	3.7
□	3.7	Rs232 Baud Rate	3.8
□	3.8	Buzzer Prog End	3.9
□	3.9	Buzzer Safety	3.10
	3.10	Display Contrast	3.11
□	3.11	Sensor Offset	3.12
○	3.12	Configuration stored	3

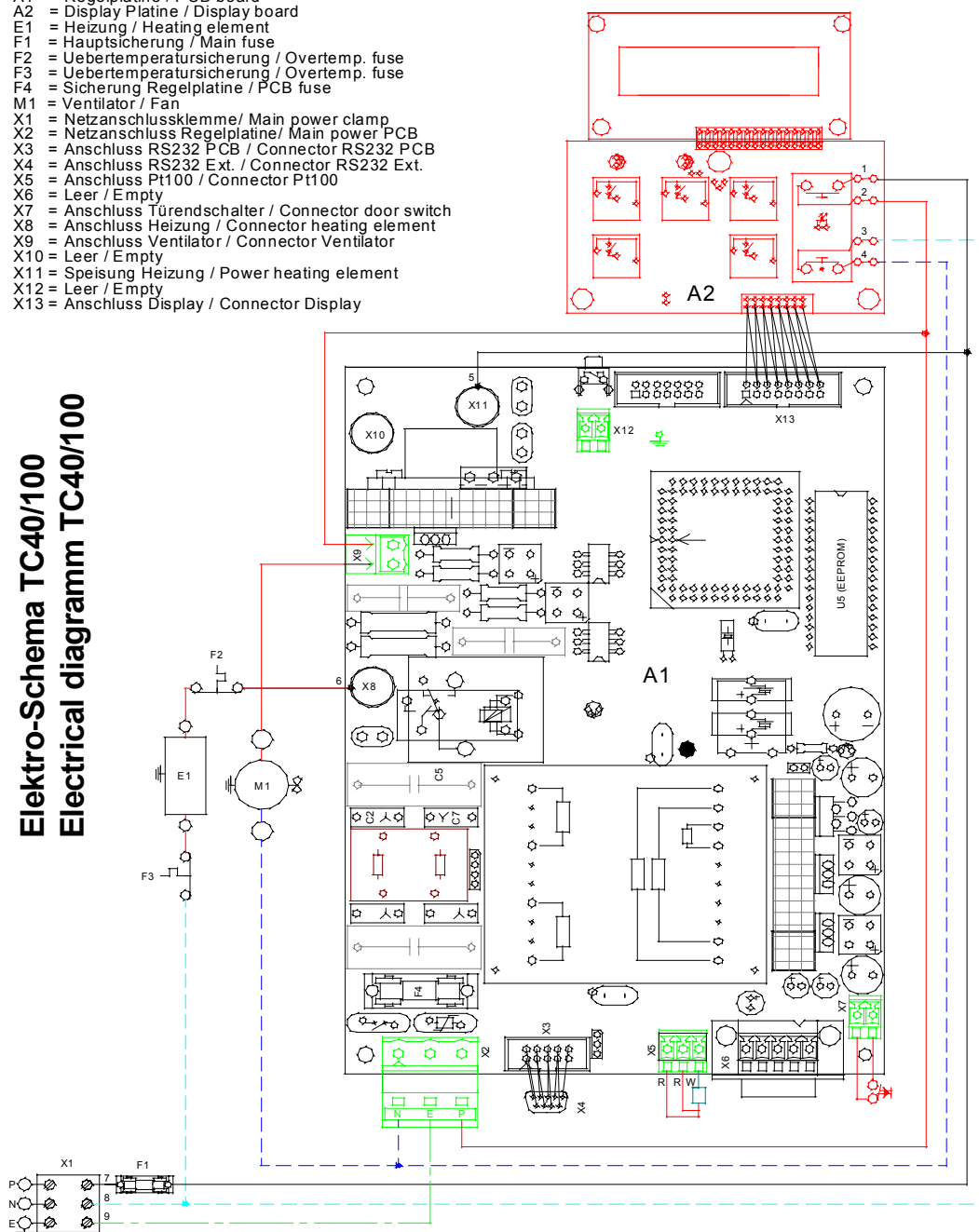


## Appendix C

### Schematic / Wiring Diagram

- A1 = Regelplatine / PCB board  
 A2 = Display Platine / Display board  
 E1 = Heizung / Heating element  
 F1 = Hauptsicherung / Main fuse  
 F2 = Uebertemperatursicherung / Overtemp. fuse  
 F3 = Uebertemperatursicherung / Overtemp. fuse  
 F4 = Sicherung Regelplatine / PCB fuse  
 M1 = Ventilator / Fan  
 X1 = Netzanschlussklemme/ Main power clamp  
 X2 = Netzanschluss Regelplatine/ Main power PCB  
 X3 = Anschluss RS232 PCB / Connector RS232 PCB  
 X4 = Anschluss RS232 Ext. / Connector RS232 Ext.  
 X5 = Anschluss Pt100 / Connector Pt100  
 X6 = Leer / Empty  
 X7 = Anschluss Türendschalter / Connector door switch  
 X8 = Anschluss Heizung / Connector heating element  
 X9 = Anschluss Ventilator / Connector Ventilator  
 X10 = Leer / Empty  
 X11 = Speisung Heizung / Power heating element  
 X12 = Leer / Empty  
 X13 = Anschluss Display / Connector Display

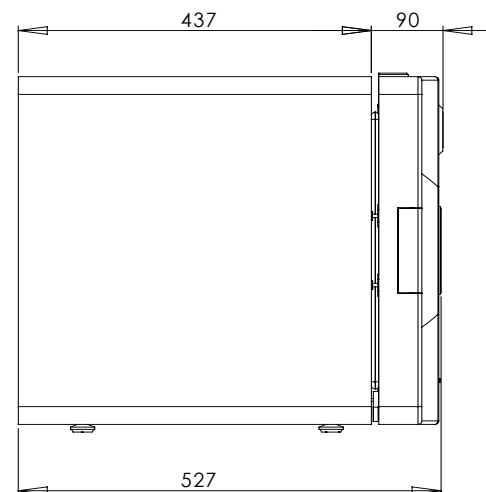
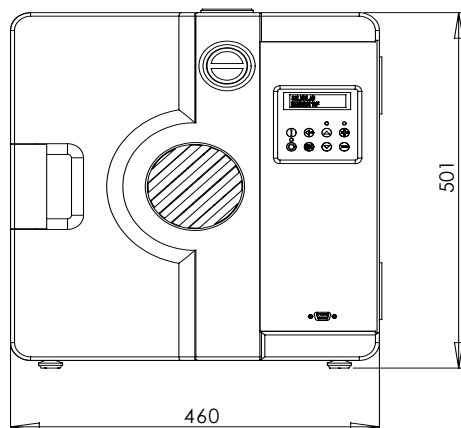
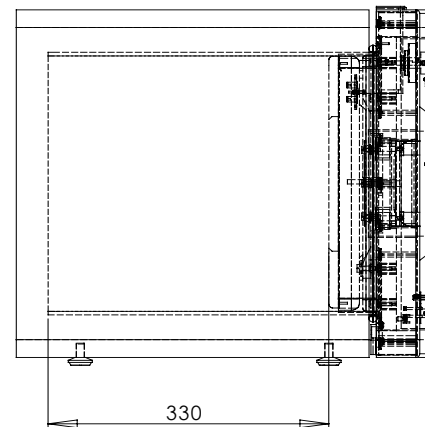
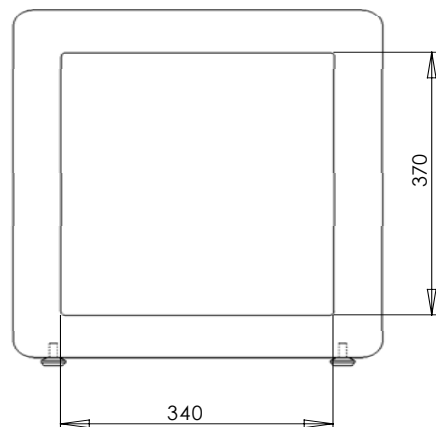
**Elektro-Schema TC40/100**  
**Electrical diagramm TC40/100**



**salvis LAB**  
MADE BY RENGGLI

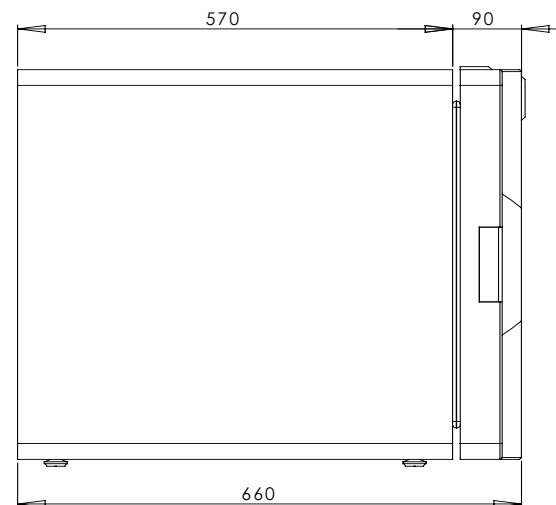
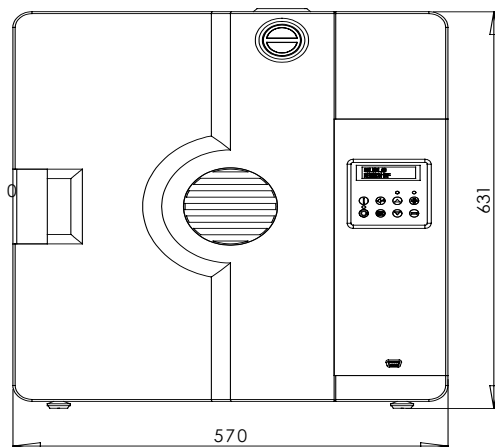
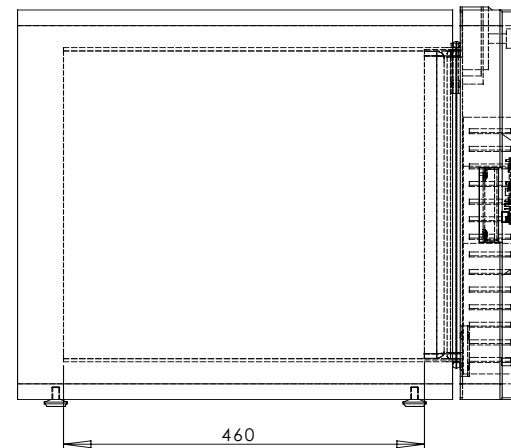
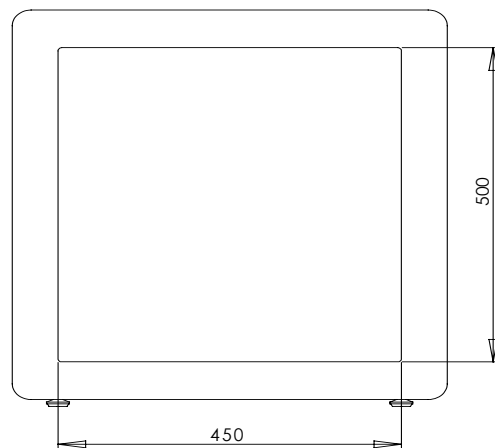
## Appendix D

### Drawing Thermocenter TC 40



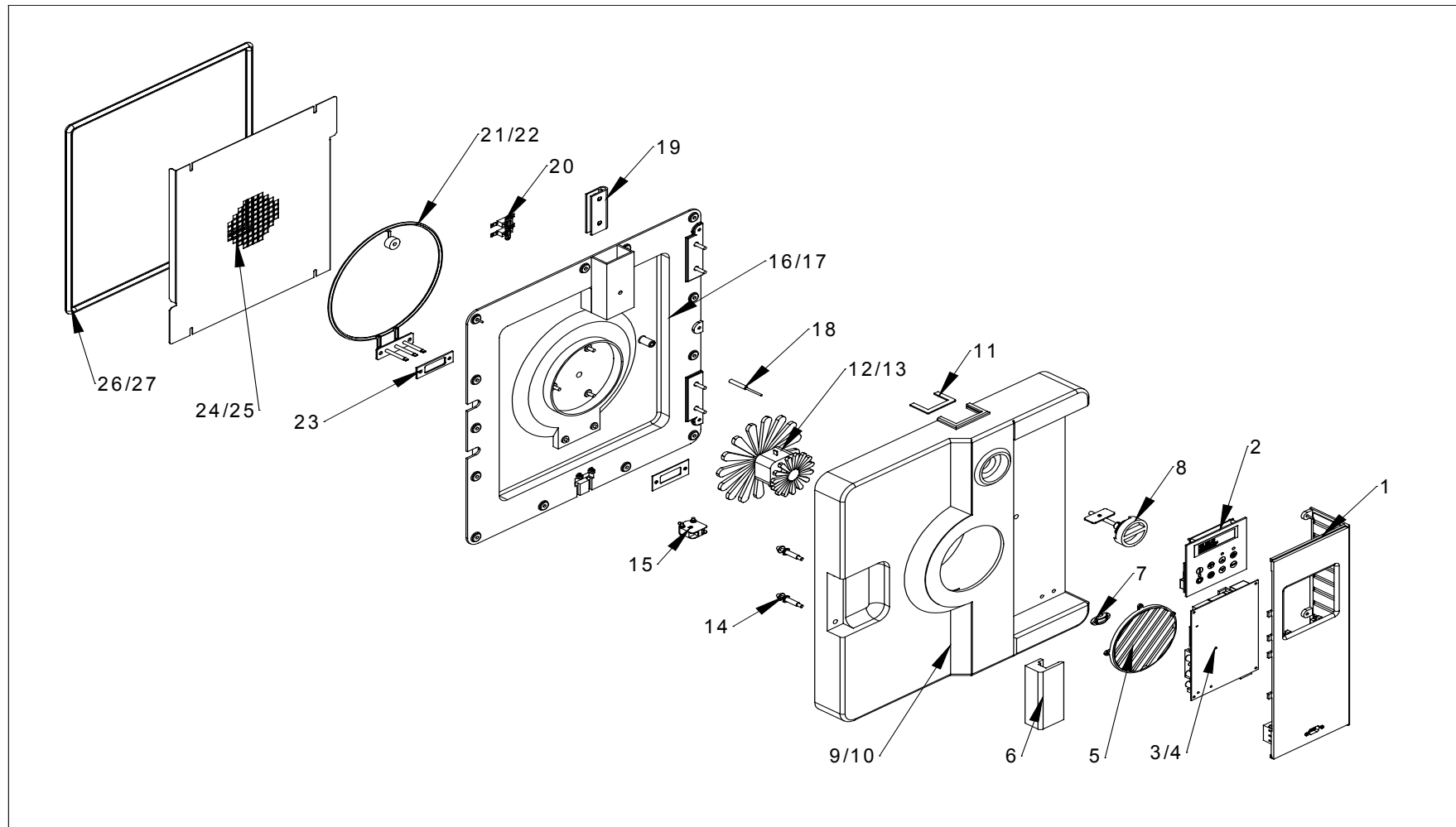
## Appendix E

### Drawing Thermocenter TC 100



## Appendix F

### Drawing Spare Parts



## Appendix G

### Spare Part Numbers

Position	Part. Nr.	Description
1	31W04141005	Panel TC-40/100
2	31W04144152	Display / Touch Panel 115V/230V
3	31W04144150	Main PCB 230V / 10A
4	31W04144151	Main PCB 115V / 10A
5	31W04142002	Air Inlet Protection Cover
6	31W04144014	Door Handle
7	31W04144013	Cable Relieve
8	31W04144018	Exhaust Knob
9	31W04140003	Door Outer Case TC 40
10	31W04140001	Door Outer Case TC 100
11	31W04144017	Insulation for Exhaust
12	31W04143019	Ventilator 230V
13	31W04143053	Ventilator 115V
14	31W04144016	Closing Bolt
15	31W04960700	Door Switch
16	31W04140002	Door Inner Case TC 40
17	31W04140000	Door Inner Case TC 100
18	31W04144123	Temperature Probe PT100
19	31W04144002	Door Hinge
20	31W04962507	Over Temperature Fuse
21	31W04144012	Heating Element 230V
22	31W04144110	Heating Element 115V
23	31W04144009	Insulation to Heating Element
24	31W04143107	Air Distribution Plate TC 40
25	31W04143106	Air Distribution Plate TC 100
26	31W04943203	Door Seal TC 40 / 1,5 Meter
27	31W04943203	Door Seal TC 100 / 2,0 Meter